

# Advanced Capabilities Medical Suction Device, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



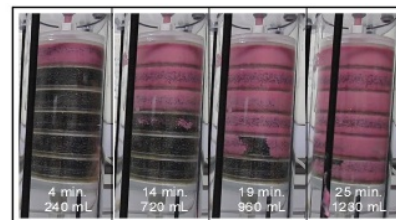
## ABSTRACT

An innovative Microgravity Compatible Medical Suction Device (MCMSD) is proposed for the efficient aspiration and containment of bodily fluids and vomitus in a microgravity environment without the release of infectious agents. A design developed and tested in the Phase I work consisted of a reusable vacuum shell and disposable cartridges. Cartridges were capable of retaining bodily fluid simulants including saline solution, yogurt, cottage cheese, and a bovine blood/saline mixture with no release of fluids to the environment or vacuum system. The cartridge design has been advanced to include cartridges capable of retaining fluid mixtures with high solids content and direct collection of vomitus from affected individuals. The Phase II effort will build upon the highly successful feasibility demonstration resulting in the development of a prototype MCMSD consisting of a rigid vacuum shell and collapsible/disposable cartridges capable of gravity independent collection and retention of up to 1.3 liters of biological fluids/solids.

## ANTICIPATED BENEFITS

### To NASA funded missions:

Potential NASA Commercial Applications: The NASA application for the (MCMSD) technology will be as Flight Hardware for deployment in support of future, long duration exploration missions to Mars or other Near Earth Objects (NEOs) where the availability of emergency medical support will be highly valued. Many medical procedures require aspiration, such as removal of saliva and blood during dental procedures; blood and loose tissue during surgery; or vomit, mucous, and saliva during airway management. The MCMSD provides a simple, energy efficient microgravity compatible method to trap and contain blood, urine, saline rinse water, vomitus, and other multi-phase biological materials. The MCMSD irreversibly traps these biological materials in a porous matrix and retains infectious



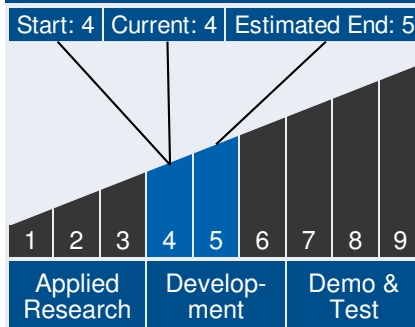
Aspiration of Yogurt into a MCMSD Cartridge

Advanced Capabilities Medical Suction Device

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## Technology Maturity



## Management Team

### Program Executives:

- Joseph Grant
- Laguduva Kubendran

### Program Manager:

- Carlos Torrez

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agents from the aspirator gas stream while eliminating the possibility of spillage. The MCMSD fills the medical need for aspiration where there is currently no commercially available device that will effectively and cleanly aspirate biological materials in microgravity.

## To the commercial space industry:

Potential Non-NASA Commercial Applications: The MCMSD technology is gravity independent and can be used both in microgravity on commercial space flights and terrestrially by emergency medical personnel. In both military and civilian emergency medicine, aspirator collection consists of a gravity dependent reservoir connected to a vacuum source. The reservoir must remain vertical to prevent blockage/damage of the vacuum pump and guard valves. Excessive tipping or jostling of the reservoir can result in loss of suction. The operation of the MCMSD is not affected by orientation to Earth gravity field and allows medical personnel to focus on the patient and not on an aspirator reservoir. Additionally, the MCMSD cartridge is sealed and disposed of, while a reservoir must be manually emptied resulting in possible exposure of medical personnel to infectious agents. These advantages make the MCMSD the clear choice when trouble-free aspiration is required 'in the field' or during transportation of the patient.

## Management Team (cont.)

### Principal Investigator:

- William Michalek

## Technology Areas

### Primary Technology Area:

Human Health, Life Support, and Habitation Systems (TA 6)

- └ Environmental Control and Life Support Systems and Habitation Systems (TA 6.1)
  - └ Air Revitalization (TA 6.1.1)
    - └ Trace Contaminant Control (TA 6.1.1.3)

### Secondary Technology Area:

Human Health, Life Support, and Habitation Systems (TA 6)

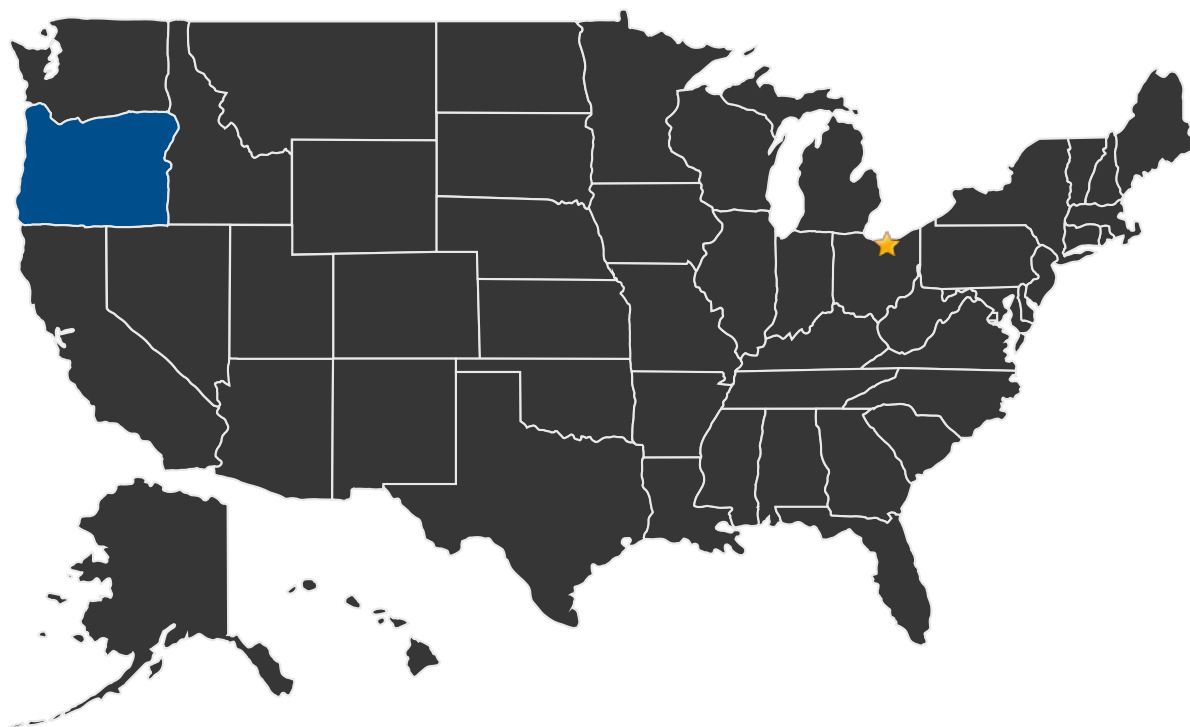
- └ Human Health and Performance (TA 6.3)
  - └ Medical Diagnosis and Prognosis (TA 6.3.1)

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## U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States With Work      ★ **Lead Center:**  
Glenn Research Center

### Other Organizations Performing Work:

- UMPQUA Research Company (Myrtle Creek, OR)

## PROJECT LIBRARY

### Presentations

- Briefing Chart
  - (<http://techport.nasa.gov:80/file/20290>)

Active Project (2015 - 2017)

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## DETAILS FOR TECHNOLOGY 1

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### Technology Title

Advanced Capabilities Medical Suction Device